ABSTRACT

Indonesia is the largest archipelagic country in the world with an area of about 1,904,569 km2 and a coastline of 54,716 km. Indonesia has more than 17,000 islands, of which only about 7000 are inhabited. In this Industrial Era 4.0, Electrical Energy is a primary need for all people to support all their activities and lives, whether in large urban areas or even rural areas.

One of the islands that is still not fully electrified is Nusa Penida Island in Klungkung Regency, Bali Province. The area of Nusa Penida is 202,804 hectares with a total population of 47,488 people. In this study, the author makes a simulation system for a hybrid power plant on the island of Nusa Penida. Where this system is a combination of a wind power plant, and a solar power plant. It is hoped that this system can provide an overview of the results of the existence of a hybrid power plant using HOMER (Hybrid Optimization of Multiple Energy Resources) software.

In this study, the optimal PLTH (Hybrid Power Plant) options that have the potential to be built in the Nusa Penida sub-district are PLTD (Diesel Power Plant) with a capacity of 11.9 MW, PLTS (Solar Power Plant) with a capacity of 3.5 MW, BESS with a capacity of 3 MW, and a PLTB (Wind Power Plant) with a capacity of 4 MW. Based on the total analysis results of energy cost calculations that have been obtained from PLTH, the results of Life Cycle Cost (LCC) are obtained at \$62,358,890, Payback Period (PBP) shows that it takes 11.6 years to return the total investment capital. Then the calculation of the investment feasibility analysis that has been done, shows the NPV value of \$35,589,268.96. The Profit Index value is 7.53, and the IRR value is 37.38%. With all these results, it shows that the economic feasibility of the PLTH development in Nusa Penida can provide benefits.

Keywords: nusa penida island, hybrid power plant, homer